

REMARKS

The examiner withdrew the objection to claims 22, 23 and 30 and the rejection of claims 19 and 24 under 35 U.S.C. 112.

35 U.S.C § 102

The examiner rejected Claims 1, 2 and 5-10 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,645,651 hereinafter Hockaday.

The examiner argued that:

Hockaday teaches a fuel cartridge comprising a housing 7 with a fuel egress 4 (i.e. exit port) supported by and coupled to the housing (figures 1 and 2, column 3, lines 55-64, column 5, line 1 - column 6, line 59, column 7, lines 49-50 and column 8, line 24 - column 9, line 40). Hockaday further incorporates the fuel Ampoule of the commonly assigned U.S. Pre-Grant Publication No. 2001/0049045 by reference and that U.S. Patent No. 6,645,651 is an improvement upon said fuel ampoule by adding an additional fuel source inside of a fuel cartridge to the previously known fuel ampoule, the previous fuel ampoule of U.S. Pre-Grant Publication No. 2001/0049045 is disclosed as having the following structure; a multilayer composite vaporization membrane 8 and 9, having a cylindrical shape (figures 1 and 3), disposed about a substantial portion of an interior of the housing, that has a selective permeability to allow vaporization of liquid methanol (paragraph [0052]) (i.e. as recited in claim 5) said cartridge also containing a carbonaceous compound (paragraph [0023]), said membrane comprising silicone or silicone impregnated into fiberglass cloth or polyester film, said membrane further comprising a porous substrate made of polyurethane (paragraph [0050]) (see also paragraphs [0014]-[0056]).

Claim 1 is directed to a fuel cartridge that supplies a source of fuel to a direct methanol fuel cell. Feature of claim 1 include a housing, a fuel egress port coupled to the housing to allow contents in the housing to escape from the housing through the fuel egress port and a surface area enhanced planar vaporization membrane residing in the fuel cartridge.

Applicant's claim 1 is allowable over Hockaday, because the reference neither describes nor suggests, [A] fuel cartridge ... including a housing, a fuel egress coupled to the housing to allow contents in the housing to escape from the housing through the fuel egress port and ... and a surface area enhanced planar vaporization membrane residing in the fuel cartridge.

The examiner contends that "Hockaday further incorporates the fuel Ampoule of the commonly assigned U.S. Pre-Grant Publication No. 2001/0049045 by reference." Hockaday '045 in contrast discloses a fuel

ampoule, which according to Hockaday, is threaded into a fuel cell manifold. Thus, Hockaday '045 does not disclose a fuel cartridge. Moreover, Hockaday '045 neither describes nor suggests that the cartridge has a fuel egress port coupled to the housing.

In addition, claim 1 also calls for a surface area enhanced planar vaporization membrane The examiner considers that this feature is taught by Hockaday 045' 2001/0049045 is disclosed as having the following structure; a multilayer composite vaporization membrane 8 and 9,. Applicant disagrees. Items 8 and 9 in FIGS. 1 and 2 are the walls of the ampoule¹, not a surface area enhanced planar vaporization membrane that resides in the fuel cartridge.

Now turning to Hockaday '651, this reference discloses: "A system of two fuel ampoules that can deliver a reactant by diffusion through one of the ampoule walls to the other, such that when said reactant enters the second ampoule, it reacts with another reactant in said second ampoule, making hydrogen gas as a product. Both ampoules are stored in a fuel impermeable container."² Hockaday therefore also fails to disclose the features of a fuel cartridge that includes a ... a surface area enhanced planar vaporization membrane residing in the fuel cartridge.

Accordingly, no combination of Hockaday 651 and the incorporated by reference teachings in Hockaday '045 either describes or suggests claim 1.

Claim 2

Claim 2 calls for the surface area enhanced planar vaporization membrane being a polymer membrane that is disposed about a substantial portion of an interior of the housing to provide a high surface area membrane.

Accordingly, to Hockaday, '045 items 8 and 9 are respectively, a porous fiberglass wall that is coated with silicone rubber. Alternatively, both 8 and 9 can be silicone rubber. The examiner has apparently used Hockaday '651 to teach the fuel egress port. Therefore, the examiner contends that items 8 and 9 are the surface area enhanced planar vaporization membrane. Applicant contends that the only logically reading of Hockaday is as Hockaday discloses namely, that items 8 and 9 are the walls of an ampoule. The walls are designed to allow

¹ Hockaday discloses that: "The ampoule wall 8, 9 may be constructed from pure silicone rubber." Hockaday paragraph [0050].

² Hockaday '651 Abstract.

fuel to enter the fuel cell, and therefore Hockaday has no need nor does Hockaday supply any motivation to provide: "a polymer membrane that is disposed about a substantial portion of an interior of the housing to provide a high surface area membrane." Note that in Hockaday '651 there would not exist "a polymer membrane that is disposed about a substantial portion of an interior of the housing to provide a high surface area membrane.", as called for in claim 2, but rather there would exist two ampoule walls inside of the generator. This however does not identically disclose the subject matter of claim 2.

Claims 5-9 further limit claim 1, and are allowable at least for the reasons discussed in claim 1.

Claim 10

Claim 10 recites that the fuel cartridge of claim 1 has the surface area enhanced planar vaporization membrane enhance "a delivery rate of methanol in a vapor phase to the egress port for a given cartridge size." Hockaday '045 does not describe the fuel egress port and hence cannot describe that "the surface area enhanced planar vaporization membrane enhances a delivery rate of methanol in a vapor phase to the egress port for a given cartridge size." While Hockaday '651 may disclose the fuel egress port, there is no teaching in either Hockaday that the surface area enhanced planar vaporization membrane enhances "a delivery rate of methanol in a vapor phase to the egress port for a given cartridge size.", because that is not the function disclosed by Hockaday '045 for the walls of the ampoules. Therefore, Hockaday '651 has no need to nor does Hockaday '045 or '651 supply any motivation to modify the disclosed fuel ampoule to provide the claimed enhancement of delivery rate to the fuel egress port.

35 U.S.C § 103

The examiner rejected Claims 3, 11-20, 22-30, 32 and 33 under 35 U.S.C. 103(a) as being unpatentable over Hockaday in view of U.S. Patent No. 5,069,793 hereinafter Kaschemekat.

The examiner stated:

Hockaday as discussed above is incorporated herein and U.S. Pre-Grant Publication No. 2001/0049045 further teaches the use of methanol-impermeable coatings on housing walls (paragraph [0041]).

Hockaday does not teach that the composite membrane has a coating of a methanol-impermeable material on one surface.

Kaschemekat teaches a spirally wound multi layer composite membrane comprising a porous substrate (i.e. web), a membrane disposed on a first surface of the substrate (i.e. microporous substrate membrane) and a coating that is a permselective polymer on the other surface of the substrate and said multi layer composite membrane can be a plurality of membranes (column 1, lines 11-52, column 10, lines 33-64 and example 1). Kaschemekat further teaches that different polymers can be chosen for their specific selectivity.

At the time of the invention it would have been obvious to one having ordinary skill in the art to form a multi layer composite membrane having a porous substrate with a membrane on one side and a methanol-impermeable coating on the opposite surface and then spirally wind said multi layer composite membrane in Hockaday as taught by Kaschemekat, in order to provide a fuel cartridge that will have a higher capacity for methanol storage and improved safety by limiting the amount of methanol that can be leaked out of the container if it should be punctured while at the same time allowing the right amount of fuel through the fuel egress for supply to a fuel cell. It would have also been obvious to provide multiple multi layer composite membrane in Hockaday as taught by Kaschemekat to further increase the capacity for methanol storage and improved safety of the fuel cartridge and also because it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. It would have also been obvious to use polyurethane for the membrane in Hockaday as taught by Kaschemekat in order to provide a membrane that is properly selected for its specific chemical selectivity and also since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Claim 3 calls for the feature that the “surface area enhanced planar vaporization membrane is a composite membrane comprised of multiple layers of polymer membrane to increase vapor permeation surface area.”

These claims which are all directed to aspects of the enhanced planar vaporization membrane, e.g., as “a composite membrane comprised of multiple layers of polymer membrane to increase vapor permeation surface area,” (claim 3), are allowable over the combination of references.

The examiner uses Kaschemekat to teach: “... a spirally wound multi layer composite membrane comprising a porous substrate (i.e. web), a membrane disposed on a first surface of the substrate (i.e., microporous substrate membrane) and a coating that is a permselective polymer on the other surface of the substrate and said multi layer composite membrane can be a plurality of membranes (column 1, lines 11-52, column 10, lines 33-64 and example 1). ... “

The examiner also contends that it would have been obvious:

At the time of the invention it would have been obvious to one having ordinary skill in the art to form a multi layer composite membrane having a porous substrate with a membrane on one side and a methanol-impermeable coating on the opposite surface and then spirally wind said multi layer composite membrane in Hockaday as taught by Kaschemekat, in order to provide a fuel cartridge that will have a higher capacity for methanol storage and improved safety by limiting the amount of methanol that can be leaked out of the container if it should be punctured while at the same time allowing the right amount of fuel through the fuel egress for supply to a fuel cell. It would have also been obvious to provide multiple multi layer composite membrane in Hockaday as taught by Kaschemekat to further increase the capacity for methanol storage and improved safety of the fuel cartridge and also because it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. It would have also been obvious to use polyurethane for the membrane in Hockaday as taught by Kaschemekat in order to provide a membrane that is properly selected for its specific chemical selectivity and also since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Applicant disagrees that the combination of references is suggested. One motivation offered by the examiner is "...to further increase the capacity for methanol storage and improved safety of the fuel cartridge." However, adding a membrane would not increase the capacity of methanol storage (it occupies space and thus would reduce it). Secondly, arguably Hockaday already offers a more effective safety mechanism than Kaschemekat, namely, open cell foam.³

Claim 11, directed to a fuel cartridge including a housing, a fuel egress port supported by the housing and a composite membrane residing in the fuel cartridge including a porous substrate, a polymer membrane disposed over a first surface of the porous substrate and a coating of a methanol-impermeable material disposed over an opposite surface of the substrate, is allowable for analogous reasons given in claims 1 and 3 for instance.

Claims 12-23, which depend directly or indirectly from claim 11 are allowable at least for the reason that they depend from claim 11.

Claim 24 is allowable over the combination of references, since no combination suggests a composite membrane including a porous substrate, a polymer membrane ... and a coating of a methanol-impermeable material disposed over an opposite surface of the substrate. No

³ Hockaday [0050]

combination of the references suggests and a coating of a methanol-impermeable material disposed over an opposite surface of the substrate.

Claims 25-33 are allowable at least because they depend from claim 24.

The examiner rejected Claim 4 under 35 U.S.C. 103(a) as being unpatentable over Hockaday in view of U.S. Patent No. 5,681,467 hereinafter Solie.

The examiner argued that:

**Hockaday as discussed above is incorporated herein.
Hockaday does not teach that the membrane has a series of folds.
Solie teaches spirally wound membrane filters that is folded into predetermined shapes dependent upon the application (figures 1 and 2 and column 3, lines 15-55).
At the time of the invention it would have been obvious to one having ordinary skill in the art to include folding the membrane of Hockaday as taught by Solie, in order to increase the overall surface area of the membrane to allow more methanol to be released and supplied to the fuel cell.**

Claim 4 is distinct over Hockaday taken with Solie, because Hockaday, as discussed above, neither describes nor suggests the features of the base claim and Solie does not cure the deficiencies in Hockaday.

The examiner acknowledges that: Hockaday does not teach that the membrane has a series of folds. While Solie teaches a method to form a membrane into a predetermined shape, Applicant contends that like Hockaday, Solie also does not teach that the membrane has a series of folds. Moreover, the combination of Hockaday with Solie, "in order to increase the overall surface area of the membrane to allow more methanol to be released and supplied to the fuel cell." is not suggested, at least because Hockaday is directed to a fuel ampoule not a cartridge and to modify the elements 8 and 9 of Hockaday to provide them as a series of folds would not appear to be workable or at the very least would require additional modification of the fuel cell-ampoule arrangement, as taught by Hockaday, and which the examiner has not addressed.

Claims 21 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hockaday in view of Kaschemekat as applied to claims 11 and 24 above, and further in view of U.S. Patent No. 6,207,369 hereinafter Wohlstadter.

The examiner argues that:

Hockaday as modified by Kaschemekat does not teach that the membrane is a sintered metal coated with a polymer.

Wohlstadter teaches that filters may comprise sintered metals coated with polymer membranes (column 70, line 66 - column 71, line 4).

At the time of the invention it would have been obvious to one having ordinary skill in the art to include a sintered metal coated with a polymer as the membrane for Hockaday as modified by Kaschemekat as taught by Wohlstadter in order to increase the overall rigidity of the fuel cartridge thus making it more durable and also since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

As pointed out above, Hockaday, as modified by Kaschemekat, is not suggested and does not teach the features of the base claims and the addition of Wohlstadter also does not cure the deficiencies in the base combination.

Double Patenting

The examiner provisionally rejected Claims 1-8, and 10 on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-6, 8 and 12 of co-pending Application No. 10/664,405.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant invention fully encompass the scope of the claims in copending Application No. 10/664,405; the only difference is the claims in copending Application No. 10/664,405 further limit the structure by adding either a heating element or a bladder and piston arrangement.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim 1 from co-pending Application No. 10/664,405 is reproduced below:

1. A fuel cartridge comprising:
a housing ;
a fuel egress port supported by the housing; and
a heat producing element disposed in thermal communication
with an interior portion of the housing.

In contrast claim 1, reproduced above, requires ... a surface area enhanced planar vaporization membrane residing in the fuel cartridge.

According to the examiner, the purpose of the non-statutory double patenting rejection is “to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees.”⁴ Because claim 1 of the instant application and claim 1 of the co-pending application require respectively, “a surface area enhanced planar vaporization membrane residing in the fuel cartridge” and “a heat producing element disposed in thermal communication with an interior portion of the housing” no extension of the monopoly of one would be occasioned by the other since the claims are directed to different, non-overlapping subject matter.

The examiner has not offered any reasoning why a surface area enhanced planar vaporization membrane residing in the fuel cartridge would render obvious “a heat producing element disposed in thermal communication with an interior portion of the housing,” as recited in the co-pending application.

Applicant has amended claim 2 from the co-pending application. Claim 2, which required: ... a surface area enhanced planar vaporization membrane residing in the fuel cartridge, the surface area enhanced planar vaporization membrane disposed in thermal communication with the heat producing element.”, was amended in a manner that prevents an extension of any monopoly of the claims in the instant application.

The claims with the claim amendments from the co-pending case are reproduced below:

2. (Currently Amended) The fuel cartridge of claim 1 further comprising: ~~and~~
a surface area enhanced planar vaporization membrane ~~residing in the fuel cartridge at the heat producing element, the surface area enhanced planar vaporization membrane disposed in thermal communication with the heat producing element.~~

3. (Currently Amended) The fuel cartridge of claim 1 ~~2~~
wherein the surface area enhanced planar vaporization membrane is disposed about a substantial portion of an interior perimeter of the heat producing element. ~~the housing to provide a high surface area membrane~~

⁴ Examiner's Action page 7.

Because claim 1 of the instant application requires that “a surface area enhanced planar vaporization membrane residing in the fuel cartridge.”, whereas claim 2 requires that “a surface area enhanced planar vaporization membrane at the heat producing element,” there is no overlap in claimed subject matter.

The examiner provisionally rejected Claims 1-3, 5-8 and 10 on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1, 2, 6-9, 11 and 12 of co-pending Application No. 10/664,818.

The examiner argued that: “Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of both applications just use different words to claim the same thing.”

Applicant had previously argued:

Although claims 8-17 of the co-pending application recite “cartridge,” those claims have been amended, by preliminary amendment filed in that case on the same day as this reply, to call for a “container,” as recited in the base claim 1 and claims 2-7. In contrast, claims of the instant application are directed to a “cartridge.” The conflicting claims are not identical and are patentably distinct from each other because the claims of both applications are directed to different items.

Nevertheless, applicant will consider filing of a terminal disclaimer in view of application ‘818, upon an indication of allowable subject matter.

Upon further consideration Applicant contends that this rejection is improper. The subject matter of the claims of the co-pending application all require that the housing have “at least a portion of a wall of the housing being comprised of a thermally conductive material.” No such feature is recited in any of the claims of the instant application.

Therefore, the subject matter of each case is directed to patentably distinct features and the rejection is improper and Applicant will maintain a clear line of demarcation among the applications.

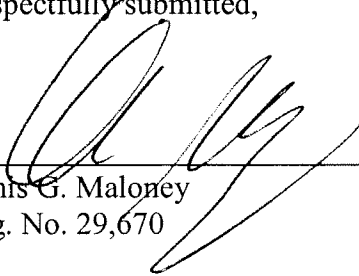
Applicant : Javit A. Drake et al.
Serial No. : 10/664,822
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Attorney's Docket No.: 08935-297001 / M-5031

Please charge the Petition for Extension of Time fee of **\$120** and please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: 12/12/07



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